Patent Application of

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For

Butterfly Sponge Mop

Field of the Invention

This invention relates to sponge mops, and more particularly to a type known as a butterfly mop wherein a self-wringing mechanism transversely folds and squeezes together two wing-like halves holding a detachable sponge.

Background of the Invention

Self-wringing sponge mops are well known, and many prior art designs exist. Generally a long tubular handle and a detachable sponge or sponge-like material are affixed to more or less opposite ends of a mop head assembly that includes a self-wringing mechanism. As is known, the long tubular handle extends the user's reach, the detachable sponge allows for sponge replacement when needed, and the self-wringing mop head mechanism provides a useful and convenient means to quickly and repeatedly expel dirt and liquid from the sponge.

Butterfly type self-wringing mechanisms for sponge mops are also well know, wherein the detachable sponge is mounted on parallel wing-like halves that hinge transversely toward each other along axes more or less aligned with the mop handle. To squeeze the sponge various sliding or rotating mechanisms are known, or combinations thereof. Many show a pivoting yoke or lever that rotates around an axis positioned longitudinally above the sponge (and therefore perpendicular to the wing axes) that is moved back and forth past the wings to alternately squeeze and release them, thus expelling dirt and liquid from the sponge. Rollers may be mounted on the yoke to reduce sliding friction, and return springs may be attached to the hinged wings to assist their movement. Additionally, a movable handle mounted grip or

lever may be attached to the yoke via a linkage, thus allowing the wringing mechanism to be actuated remotely. This helps prevent the user's hands from becoming soiled by a wet and dirty sponge.

Despite the manufacturing cost and assembly complexity posed by the use of such elaborate wringing mechanisms as those enumerated above, butterfly mops have nevertheless proven successful over many years by dint of their compact size, efficient functionality, and ease of operation. More recently, the use of molded thermoplastic resin construction has helped reduce the cost and complexity of butterfly mops. For example, it is known that separate fasteners (e.g., screws and rivets) can be eliminated by integrating their function into molded parts. It is also known that resin parts need not be plated or painted to resist rust, unlike sheet steel components traditionally used. It is also known that separate butterfly wings formerly attached with hinge pins can be molded as integral parts of the mop head by interconnecting them with thin flexible webs known as living hinges. And it is also known that friction reducing rollers can be eliminated because certain molding resin have low friction coefficients (e.g., they slide easily against other surfaces).

Description of Prior Art

U.S. Pat. No. 2,643,407 (Vosbikian) discloses a sponge mop with an early butterfly style wringing mechanism. The wringing mechanism requires at least eight separate parts, namely, a central body, two hinged wings, two hinge pins, a pivoting extractor lever, and two cone shaped rollers to reduce friction. In fact this invention is currently manufactured and sold as the Quickie Automatic Sponge Mop, but with at least five additional parts, namely, two wing return springs, a movable remote grip, a linkage connecting the extractor lever to the remote grip, and a rivet connecting the remote grip to the linkage. Thus, the wringing mechanism of this mop requires a total of at least thirteen individual parts.

In summary, the Vosbikian patent, as exemplified by the Quickie Automatic Sponge Mop, teaches a useful butterfly sponge mop design but requires many separate parts that increase its manufacturing cost and assembly complexity.

U.S. Pat. No. 4,044,419 (Robinson) discloses a sponge mop with an improved butterfly style wringing mechanism, wherein Quickie's thirteen part construction described above has been reduces to just three, namely, a one piece central body with integrated wings, a one piece

actuator lever with integrated grip, and a single return spring. First, Quickie's five-piece wing assembly (central body, two wings, and two hinge pins) has been reduced to just one part, namely a central body with integrated wings. Injection molded thermoplastic resin construction allows the wings to integrally connect to the central body using thin flexible webs known as living hinges, thus eliminate the need for separate wings and hinge pins. Second, Quickie's six-piece lever and grip assembly (lever, two rollers, grip, linkage, and rivet) has been reduced to a single part. The use of injection molded resin construction allows the elimination of separate rollers to reduce friction, and also allows the grip to be integrated into the lever. Relocation of the grip and lever to the upper side of the mop head moves the user's hands away from the wet and dirty sponge, thus reducing the need for a remote grip, linkage, and rivet. Third, Quickie's pair of wing return springs is replaced by a single spring passing across the central body to connect one wing to the other.

Certain problems are apparent on closer examination of the Robinson patent. First, it claims a mop head of two basic parts, but in fact it shows a third part, a wing return spring, that is required to return the wings to their in-line planar position. Extra parts add cost and complicate assembly. Second, the parallel actuator members that squeeze the sponge are generally unsupported or interconnected near where they squeeze the central portion of the sponge, and thus may deflect or twist outward and provide a less satisfactory wringing action, particularly with denser and less compressible sponge materials. Third, both molded parts require expensive die side actions to be molded as shown in the patent. The stiffening ribs around and across the outsides of the parallel members of the actuator cannot be molded except with large outwardly movable die side actions with elaborate matched parting lines. And at least one or more of the features described on the mop head (handle socket, actuator socket, or spring locating pins) will also require expensive die side actions.

In summary, the Robinson patent teaches useful improvements over the Vosbikian patent, but further improvements are possible, particularly with regard to making the molded parts less costly through more efficient geometry and fewer required die side actions.

Summary of the Invention

The butterfly sponge mop according to my invention includes a pair of hinged wings integrally molded onto one end of an actuating lever. This lever pivots forward and back

within an enclosed yoke. Moving the lever forward causes the wings to swing closed, thus squeezing a detachable sponge. Moving the lever back to its original position causes the wings to swing open, aided by the compression of the sponge. The wings are positively held in their open position by wing tabs that move in and out of corresponding pockets within the yoke as the actuating lever is moved forward and back. The lever continuously changes its mechanical force on the wings, such that initial forward movement closes the wings rapidly, while further forward movement produces a decreasing movement of the wings.

It is an object of my invention to provide a butterfly sponge mop that requires only two parts for the entire wringing mechanism, this being an improvement over the three part Robinson patent described above (e.g., two basic parts, plus a return spring). It is another object of my invention to provide a butterfly sponge mop with wing tabs that hold the wings in their open position, thus eliminating the need for wing return springs. It is another object of my invention to provide a butterfly mop wherein the yoke holding the actuating lever is of enclosed design, with unique girder geometry. It is another object of my invention to provide a butterfly mop wherein the yoke holding the actuating lever can be molded in a molding die with no side actions except one, and that one being of small size and simple geometry. It is a further object of my invention to provide a butterfly sponge mop wherein the actuating lever with its integrally molded wings can be molded in a molding die with no side actions whatsoever.

Brief Description of the Drawings

FIG. 1 is a front perspective view of a butterfly sponge mop in the open position.

FIG. 2 is a view similar to FIG. 1 showing the sponge partially squeezed or actuated.

FIG. 3 is a view similar to FIG. 1 showing the sponge fully squeezed or actuated.

FIG. 4 is a front perspective view of the enclosed yoke.

FIG. 5 is a rear perspective view of the enclosed yoke.

FIG. 6 is a front perspective view of the actuating lever.

FIG. 7 is a rear perspective view of the actuating lever.

Reference Numerals Used in Drawings

20 wringing assembly
22 detachable sponge
24 tubular handle
26 actuating lever
28 enclosed yoke
30 wing
32 living hinge
34 central body
36 aperture
38 extension
40 grip
42 tab
44 trailing edge
46 boss
48 wall
50 void
52 rib
54 opening
56 socket
58 girder
60 skirt
62 support
64 slot
66 guide
68 pocket
72 edge
74 bearing point, start
76 path
78 bearing point, end

Detailed Description of the Drawings

Referring to **FIGS. 1** through **FIG. 7**, the butterfly sponge mop according to my invention generally includes a wringing assembly **20**, a detachable sponge **22**, and a tubular handle **24**. The wringing assembly includes an actuating lever **26** and an enclosed yoke **28**, both being preferably constructed of a rigid injection molded thermoplastic such as polypropylene.

The actuating lever **26** has wings **30**, **30** integrally connecting by living hinges **32**, **32** to either side of a central body **34**, the hinges being spaced apart so that in the squeezed position they are generally parallel to each other. An aperture **36** to receive the detachable sponge **22** may be positioned more or less centrally on each wing **30**. An extension **38** connects a grip **40** to the central body **34**. A tab **42** extends from the trailing edge **44** of each wing **30**, positioned adjacently above the living hinge **32**. A short round boss **46** extends outward from either side of a wall **48** located longitudinally on the central body **34**. The axis of the bosses **46**, **46** passes transversely across the central body slightly above the hinges **32**, **32**. A generally C-shaped void **50** around each boss **46** allows them to formed between mating

halves of a molding die, rather than by moving side actions in the die. Dies without moving side actions are less expensive to design, fabricate, and maintain. All features of the actuating lever **26** and its integrally molded wings **30, 30** are positioned relative to each and angled in such a manner that it can be molded entirely within a die without moving side actions. Optional stiffening ribs **52** on the rear of the actuating lever **26** and its integral wings **30, 30** allow for more efficient material structure (e.g., thinner, lighter, and less expensive), but their absence has little or no detrimental effect on the function of my invention.

The enclosed yoke **28** has a large central opening **54** for the actuating lever **26**. The opening **54** tapers toward a socket **56** at one end that receives the tubular handle **24**. The socket **56** is connected on either side via triangulated girders **58** to a curved skirt **60** at the other end. A pair of generally J-shaped supports **62, 62** project rearward from the central portion of the skirt **60** adjacent to the central opening **54**, and are separated by a slot **64**. Angled guides **66, 66** project inward from either side of the central opening **54**, adjacent to where the girders **58, 58** meet the skirt **60**. A portion of the guide **66** forms an open and generally V-shaped pocket **68**. These pockets **68, 68** hold the wings **30, 30** in their open position by receiving wing tabs **42, 42**.

To assemble the wringing assembly **20** during manufacture, the actuating lever **26** is positioned above the enclosed yoke **28** more or less in its fully actuated position as shown in **FIG. 3** (e.g., grip **40** forward and wings **30, 30** closed). The bosses **46, 46** on the actuating lever **26** are then pressed downward into their corresponding J-shaped supports **62, 62** on skirt **60.** The actuating lever **26** can then be moved back, causing the wings **30, 30** to pass rearward within and through opening **54**. Without the detachable sponge **22** attached, wings **30, 30** can easily pass back and forth through opening **54**. Preferably the combined thickness of the wings **30, 30** is slightly greater that the corresponding dimension within opening **54**, as this prevents the assembly from freely coming apart when the sponge **22** is removed. With the sponge **22** attached, the combined thickness of the wings **30, 30** plus the double thickness of the compressed sponge **22** in its fully actuated position makes it much more difficult or impossible for the wings **30, 30** to fully pass though the opening **54**.

In operation, the actual squeezing or compression of the sponge **22** occurs as the user pushes the grip **40** of the actuating lever **26** away from the tubular handle **24**, causing the wings **30, 30** to be pulled past guides **66, 66** within the large central opening **54** of the

enclosed yoke **28**. In its starting position the wings **30**, **30** are more or less in line or parallel against rear perimeter edges **72**, **72** of the skirt **60**, with tabs **42**, **42** located within pockets **68**, **68**. Before the user starts to push the actuating lever **26**, guides **66**, **66** are located at or near bearing points **74, 74**, just outboard of tabs **42, 42** and close to trailing edges **44, 44**. During movement of the actuating lever **26** the wings **30**, **30** move past the guides **66**, **66**, causing the paths **76**, **76** of the bearing points **74**, **74** to move continuously further away from hinges **32**, **32**, ending up at points **78**, **78**, more or less centrally located near apertures **36**, **36**. Tabs **42**, **42** have now passed completely through opening **54**, but when the user moves the actuating lever **26** back to its starting position, tabs **42**, **42** move back into pockets **68**, **68**, again holding the wings **30**, **30** in their original more or less in-line starting position.

By producing a geometry that moves the bearing paths **76**, **76** continuously away from the hinges **32**, **32** during forward movement of the actuating lever **26**, a decreasing movement of wings **30**, **30** occurs as lever movement increases, thus producing an increasingly more powerful squeezing action on the sponge **22**.

The present invention has now been described in connection with a number of specific embodiments thereof. However, numerous modifications that are contemplated as falling within the scope of the present invention should now be apparent to those skilled in the art.